

## **ABSTRACT**

The present invention relates to adsorption and regeneration of adsorbent media for air pollution control, volatile organic compound (VOC) control, hazardous air pollutant (HAP) control, toxic air contaminant (TAC) control, and solvent recovery. The present invention is an improved device for removing VOCs/HAPs/TACs from high volume air streams to ultra-low levels using synthetic polymeric adsorbents. The invention is embodied in a HAP adsorption section, a regeneration section, and a chemical destruction or recovery section. In order to recover HAPs from low concentration air streams, multiple adsorption (concentration) steps may be necessary. Adsorption is typically accomplished with a multi-tray fluidized bed operating in the moving bed to fully fluidized regime. The regeneration section has a either a long, multi-stage regeneration column with a high number of stages relative to the number of theoretical desorption stages required or a recirculating fluidized bed with a high make-up air to volume ratio. Destruction can be carried out through a thermal or catalytic oxidizer or the regeneration air stream can be concentrated into fixed-bed carbon vessels.

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